

# THE PATTERN OF PUNISHMENT AND ITS RELATION TO ABNORMAL FIXATION IN ADULT HUMAN SUBJECTS\*<sup>1</sup>

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## A. INTRODUCTION

Maier and his students (19, 20, 21, 23, 24) have recently proposed a definition of frustration which is opposed to the present trend of explaining all behavior in terms of motivation. They feel that frustration and motivation are qualitatively different instigators of behavior. Maier, Glaser, and Klee say: "We prefer to limit the term frustration to designate a state where continued failure causes learning functions to cease operating and other mechanisms of adjustment to begin operating. In this sense abnormal behavior becomes qualitatively different from normal" (21, p. 540).

This conclusion is based primarily upon the results of their experimental investigations of abnormal fixation in the rat. Maier, Glaser, and Klee (21) compared the tenacity of a position response developed in a no-solution situation (a situation in which successes and failures were arbitrarily randomly distributed) with that of a position response to the preferred side developed in a situation in which such a response was consistently rewarded (a control condition). Their animals were placed in a jumping box. They were given food after each correct judgment, received a bump for the locked door and a fall into the net when they made an erroneous choice, and had an air blast directed against their bodies whenever they hesitated in the making of a choice. All retained animals soon developed position responses which they were allowed to practice for 160 trials. During these criterion trials, the members of the no-solution group received 50 per cent punishment for their habit, while the control group was rewarded after every choice.

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Both groups were then given 200 trials in which to acquire a simple discrimination habit. That is, they were to jump toward the black rather than toward the white circle. Although nine out of 10 of the control animals established this habit within the time allowed, only four of the 11 experimental animals did so. The distribution of learning scores was bimodal; the animals either learned readily or failed to learn after a large number of trials.

Furthermore, the animals which exhibited extreme persistence of the position habit appear to have done so because of failure to express a discrimination rather than of failure to learn. The presence of a learned discrimination which did not come to direct expression was evidenced by the way the animal jumped. Such animals showed differential resistance. They jumped readily when the positive card corresponded to their fixation but jumped reluctantly when their fixation caused them to choose the negative card. Also, when jumping toward the negative card, they exhibited what Maier has termed *abortive behavior*. They jumped to the right or left of the stimulus card, jumped so as to strike the card with the side of their bodies, or struck the card with so little force that it would not have been knocked out even had it been unlatched.

These persistent responses have been termed *abnormal fixations* because they appear to differ from strong habits. In the first place, their occurrence is in conflict with the laws of learning. The no-solution situation, since it results in only 50 per cent reward, should not, according to learning theory, result in the establishment of any habit. Secondly, the bimodality of the distribution of learning scores of the no-solution group is evidence of a lack of continuity of process. And finally, the existence of differential resistance and of abortive behavior indicates that the response is compulsive. *Abnormal fixations* are regarded as constituting one of the forms of frustration instigated behavior.

Later studies by the same authors have supported these findings and have resulted in further conclusions. Maier and Klee (22) found that the majority of the abnormal fixations reported in the above study persisted during a four-month vacation and during a lengthy series of tests involving both one- and two-window situations. Klee (14) compared frustration effects upon food- and air-motivated animals of an insoluble problem and found that abnormal reactions<sup>3</sup> occurred with approximately equal frequency in the two groups. Maier and Klee (24) have shown, further, that manual

<sup>3</sup>Here both the continued adherence to an erroneous principle of choice and extreme resistance were considered to be abnormal.



guidance is effective for the breaking of abnormal fixations but is of little value in the usual learning situation.

Kleemeier (15) and Maier and Klee (23) have shown respectively that habits established in a multiple choice and in a discrimination problem can be transformed into abnormal fixations. Maier and Klee (23) employed 60 rats divided into three principal groups. They forced the first of these groups to jump in a Lashley jumping apparatus in a no-solution situation, the second group to learn a position habit with the original preference of each as correct, and the third to establish a discrimination which corresponded to the one most commonly preferred. After the criterion had been reached, that is, after a given response had appeared 77 per cent of the time during 160 trials, the situation was changed to require a reversal or a shift of habit. The term *reversal of habit* was used to refer to a change from preference for one of the cards to preference for the other and to a reversal of a position habit. A change in habit from a position to a discrimination or from a discrimination to a position was termed a *shift*. A modification of the procedure to necessitate a reversal of habit required 100 per cent punishment of the former response, whereas a modification necessitating a shift of habit required 50 per cent punishment of the former response.

It was found that 100 per cent punishment either produced a rapid alteration of the habit or failed to do so in the 200 trials allowed; 50 per cent punishment altered habits more slowly but more surely. The authors say: "If the animals do not experience frustration, then 100 per cent punishment is highly effective for relearning. If, however, they have a low level of tolerance or do not learn soon enough, then 100 per cent punishment becomes frustrating and the resulting fixations appear" (23, p. 385).

Patrick (29, 30) demonstrated that increased stereotypy of response is a component of human emotional behavior. He tested college students in a multiple choice situation in which there was no definite mode of adjustment. Each of the 11 subjects was put, 10 times per day for 10 days, into a small room with four exit doors, one of which was unlocked. He was to determine which door was unlocked and leave the apparatus through it. There was no regular plan determining which door was correct, except that the same door was never unlocked on two successive trials. This control series was followed by an experimental series of 10 trials per day for 10 days in the same apparatus. During this experimental series distracting stimuli were presented. As soon as the subject entered the central compartment of the apparatus an electric shock, a cold shower, or a horn was activated and allowed to continue until the subject had left the apparatus.

The reactions obtained were placed in a five-fold classification. Type *A* responses were characterized by rational inference; the door which was correct on the preceding trial was not tried. Type *B* responses were characterized by an unmodified searching (the subject did not try the doors in any consistent order), Type *C* by stereotyped modes of searching, Type *D* by making more than one separate effort to open a given door during the same trial, and Type *E* by "implastic and unadaptive" behavior.

It was found that both *C* and *E* type reactions were more prevalent after the presentation of distracting stimuli than during the control condition. Whereas the majority of the reactions during the control series were of Type *A*, only 18 per cent of those during the experimental series were of this type. During the control series 2 per cent of the reactions were of Type *E*, while during the experimental series 50 per cent of the reactions were of this type. The average number of efforts to open the exit doors was consistently greater during the experimental than during the control series. Patrick (30) found that during the experimental series some of his adult subjects made almost as many efforts to open the exit doors as did Hamilton's two-year-old son (10).

#### B. STATEMENT OF THE PROBLEM

The complete adherence to an unadaptive mode of selection in a situation in which solution without frustration would have been ready has, so far as the writer knows, never been reported in an experimental investigation employing normal human subjects. That is, complete abnormal fixation has never been reported. However, it is probable that stereotypy differs from complete abnormal fixation in degree but not in kind. This may indicate that, when the establishment of a successful solution is possible, absolute consistency of adherence to an erroneous principle of choice depends upon frustration of a higher level of intensity that can safely be experimentally produced in human subjects. However, it is possible that abnormal fixations have occurred but have not been detected because of failure to consider the possibility that the obtained response differs from an ordinary habit.

It seemed desirable, then, to approximate as closely as practicable with humans the type of procedure which has been demonstrated to produce abnormal fixation in the rat. The present study modifies the procedure employed by Maier and Klee (23) (see p. 109) only to the degree necessary to adapt it to experimentation with adult human subjects. The apparatus was designed so as to make it necessary for the subject to indicate his choice of one of two stimulus cards by an overt act. Instead of two stimulus



cards placed in the doors in the two possible positions, 27 stimulus cards were arranged in 36 different combinations. The extended period of a specific pattern of punishment was obtained by making it arbitrary. And punishment took the form of shock rather than of a fall into a net.

The present study was undertaken to determine the influence of different concentrations of arbitrary punishment upon the subsequent establishment of a position response. If frustration is induced, we would expect an increase in stereotypy and possibly, in a few instances, the appearance of complete abnormal fixation. If frustration of some but not all of the subjects occurs and if frustration and motivation differ qualitatively, this method would be expected to result in the formation of two distinct populations as it does when rats are used as subjects; one population made up of frustrated persons with reduced plasticity and one group showing normal variations in learning rate and unhampered by frustration. We also attempted to determine whether frustration susceptibility is related to Bernreuter *Personality Inventory* scores.

### C. PRELIMINARY EXPERIMENT

#### 1. *Methods of Study*

*a. Apparatus.* The apparatus employed in this study consisted of a screen mounted upright on a table. In the screen, schematically presented in Figure 1, were cut holes for a one-way screen ( $ABCD$ ) and for two doors

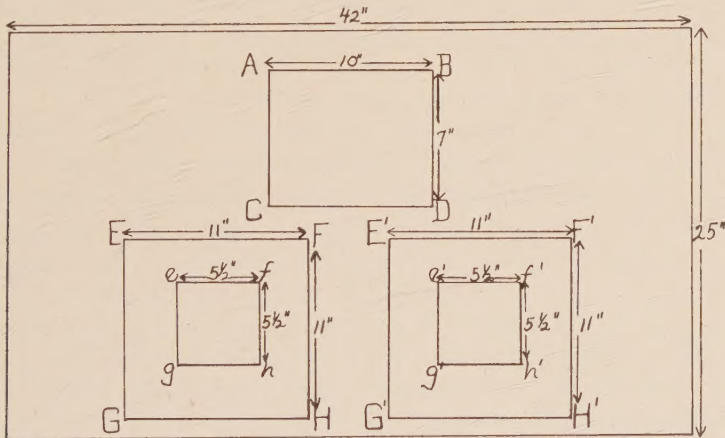


FIGURE 1

APPARATUS:

$ABCD$  is the one-way screen,  $efgh$  and  $e'f'g'h'$  the doors in which the stimulus cards are exposed.

( $EFGH$  and  $E'F'G'H'$ ). The one-way screen was made up of a 17-inch long tube which narrowed on the side of the experimenter. Both ends of the tube were covered by window screen.

The two doors were hinged at  $GH$  and at  $G'H'$  and opened toward the subject. They were unlatched by turning a lever arm at the end of which was located a cylindrical handle. The handles, which were made of lucite with a central brass core, were .550 inches in diameter and were pierced by small holes .042 inches in diameter and .0875 inches in depth which were located approximately .188 inches apart. The small holes in the insulating material of the handles were employed to reduce the differences in area of contact with different methods of grasping the knobs.

A spring forced the door open but the subject, who manipulated the latch, was required to catch the door to prevent its banging upon the table top. A handle on the back of the apparatus made it possible for the experimenter to relatch the doors when the procedure so required.

Five and one-half inch doors ( $efgh$  and  $e'f'g'h'$ ), opening toward the experimenter, were located in the center of each of the larger doors. They were hinged on their lower side and were held closed by means of flat contact springs. These doors served as exposure windows for the stimulus cards which were held in place by pegs along their lower edge and by the pressure exerted by the door.

A total of 27 stimulus cards were employed. There were three forms, three achromatic brightness and three sizes. The forms were circles, triangles, and squares. Circles one, two, and three inches in diameter were first cut on a lathe; then triangles and squares were constructed which had areas as closely as possible equal of those of the circles.

The wiring diagram is presented in Figure 2. The primary circuit was completed by turning the handle and closing the mercury switch on the same side. Thus the 5000 volt  $AC$  transformer was turned on by the subject and sparking was reduced to a minimum. In series with the transformer in the secondary circuit were 27 megohms of resistance, the handles which open the doors, and brass plates (2" by  $\frac{3}{4}$ ") fastened to the dorsal surface of each wrist by means of wrist bands and cloths wetted with saline solution. The amperage reading with the wrist band fastened to the door handle was 10 milliamperes. The voltage reading between the terminals of the transformer indicated 300 volts.

Since the experimenter was interested in individual differences in the effect of shock, the resistance in the circuit was held constant throughout. Also, no efforts to equate shock for different individuals and for the same



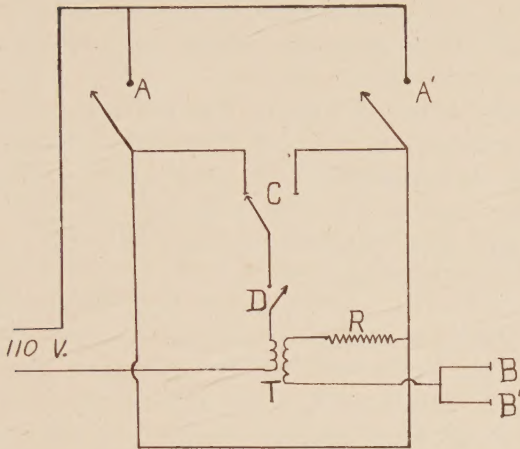


FIGURE 2

## WIRING DIAGRAM OF APPARATUS

*A* and *A'* represent the handles used by the subject to open the doors, *B* and *B'* are the electrodes fastened to the wrists, *C* is the mercury switch, *D* is an auxiliary switch, *T* is the transformer, and *R* the resistance.

individual at different times have been successful (18, 13). A shock does not mean the same thing to every subject. For some subjects it feels like punishment, for others it is an unfair aggressive act, and for still others it is a "rather stupid thing" (31). Tomkins say, "The shock probably always means something quite idiosyncratic which the subject rarely verbalizes" (31, p. 228).

*b. Procedure of the preliminary experiment.*

(1). *Preparatory arrangements.* The 45 subjects employed in this preliminary study were obtained from an elementary psychology course at the University of Michigan. They were first brought together in small groups and given the Bernreuter *Personality Inventory* with the following directions:

Sign your name to the attached card and fill in the following sheet as indicated. On the cover of the *Personality Inventory* indicate your sex, but do not sign your name. Answer the questions as accurately as possible. The results are to be used for group norms only; your name and results will be connected only if you wish to know your results.

The standardized directions for the *Inventory* were then read aloud. The sheet referred to contained spaces for the name, address, sex, field of concen-

tration, list of previous courses in psychology, and schedule of activity of the subject. Two groups were then equated, by means of the pairing of individuals, in neurotic tendency and sex.

The 27 stimulus cards employed in this study were combined to form 36 pairs. These pairs were presented in three different sequences which were used in rotation. For example, the first three pairs of the first sequence were as follows: (a) a small white circle and a large black rectangle, (b) a medium sized gray triangle and a large black circle, and (c) a large black triangle and a small gray rectangle.

Each session consisted of a period of from 35 to 50 minutes during which approximately 100 choices were made. Efforts were made to have a session every other day, but results were retained when there was a variation of from one each day to an interval of four days between sessions. The large number of sessions per subject made it necessary for the results of 10 subjects to be eliminated even with these lenient requirements.

(2). *Experimental stages.* The directions given to the subjects at the opening of the first session were as follows:

This is a discrimination learning situation. Do you know the meaning of that term? You know what trial and error learning is, don't you? Discrimination learning differs from trial and error learning in the fact that there is a pattern running throughout the situation. I am going to put cards into these windows (pointing), and you are to take your choice and open the corresponding door. This is done by turning the knob to the right in each case. If you open the wrong door, you will receive a shock from the knob. I would like to have the door opened all of the way each time. Also, will you, please, catch the door after releasing the catch. There is a spring to force it open but nothing to prevent its banging on the table after the catch has been released. If your response is correct, I would like to have you both push the door shut again and fasten the catch. If it is wrong, close the door but allow me to fasten the catch.

The subject was then allowed to open the door before the shock was turned on so as to accustom him to the method of manipulation. At the end of this session, the experimenter asked the subject not to discuss the experiment. She promised that she, at the conclusion of the final session, would answer questions and would tell the purpose of the experiment.

At the opening of the second session, the subject was told simply, "So far as it is possible we are going on from where we left off Monday" (or the day of the last session).

The experimenter entered fairly freely into all conversation started by



the subject during the experimental session, but answered all questions about the experiment itself by the promise to describe the situation at the close of the last session.

The subjects were first required to learn a complex discrimination habit (to pick the larger of the two figures if neither was a triangle but the smaller if a triangle was present). The criterion was set at 50 consecutive errorless trials to insure a feeling by the subject that he had attained the correct solution. Since there was a maximum of 10 hours available per subject, efforts were abandoned if this original habit had not been established before the middle of the ninth session.

This original learning situation was followed by a no-solution period which consisted of 50 trials of arbitrary punishment. One hundred per cent of the choices made by the members of Group *A* and 50 per cent of those made by Group *B* were arbitrarily followed by shock. At the conclusion of the no-solution period, and with no warning to the subject, the door on the left was made always correct and the subject was allowed to establish a position response. The criterion was set at 15 consecutively correct choices.

### 3. Results

*a. Learning of the original habit.* Of the 35 subjects who maintained the required schedule of experimental sessions, seven failed to form the original habit within the eight and one-half sessions allowed. Of these, three said that they had used the same method of selection consistently during the eighth and ninth sessions, and one revealed by her remarks that she had returned to her first method periodically throughout the entire experiment. However, examination of the responses fails to reveal any examples of perfect consistency.

These seven subjects responded in the same manner to an average of 14.3 of the 36 pairs on each of the last five presentations of the series, to 9.2 pairs four times out of five, and to 12.4 pairs three times out of five. Of the 14.3 pairs which were responded to in the same manner on each of the last five presentations, 3.3 (range 2-5) were consistently missed. If chance alone were operating or if the pattern of choice were changes as soon as it was found to be erroneous, 2.25 pairs should have been responded to in the same manner on all five presentations, 11.25 should have yielded different responses in only one instance, and 22.5 should have been responded to in the same manner on three out of five occurrences. Only 1.125 pairs should have been consistently missed.

There is, then, a tendency toward stereotypy of choice. However, no

subject showed complete consistency. Although several subjects felt that they were consistently using the same basis of choice, they were either erring or were using secondary bases. Since the shift in response was as frequently in the direction of from right to wrong as from wrong to right, the explanation in terms of error appears to be the more reasonable. Errors would be possible because of the complex systems employed and because of the apparent lack of attention.

The 28 subjects who established the original habit required an average of 380.8 trials; the members of Group *A* required an insignificantly fewer number of trials than did those of Group *B*. The standard deviations of 219.8 and 176.6, respectively, also fail to differ significantly from one another. The critical ratio is only .96. Table 1 reveals the number of trials

TABLE 1  
THE NUMBER OF TRIALS REQUIRED TO ESTABLISH THE ORIGINAL AND THE POSITION HABITS, CRITERION TRIALS NOT INCLUDED

| Subject | Group <i>A</i> (100%)            |                                  | Group <i>B</i> (50%)             |                                  |
|---------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|         | Trials to acquire original habit | Trials to acquire position habit | Trials to acquire original habit | Trials to acquire position habit |
| A       | 207 (M)                          | 96                               | 354 (M)                          | 38                               |
| B       | 894 (M)                          | 33                               | 286 (F)                          | 14                               |
| C       | 274 (M)                          | 7                                | 458 (M)                          | 21                               |
| D       | 458 (M)                          | 30                               | 613 (F)                          | 16                               |
| E       | 418 (M)                          | 5                                | 277 (M)                          | 85                               |
| F       | 161 (M)                          | 60                               | 629 (M)                          | 54                               |
| G       | 81 (M)                           | 93                               | 636 (M)                          | 27                               |
| H       | 603 (F)                          | 200                              | 109 (M)                          | 51                               |
| I       | 304 (M)                          | 5                                | 406 (M)                          | 5                                |
| J       | 491 (M)                          | 16                               | 540 (M)                          | 53                               |
| K       | 80 (M)                           | 147                              | 262 (M)                          | 65                               |
| L       | 163 (F)                          | 170*                             | 278 (M)                          | 70                               |
| M       | 540 (M)                          | 12                               | 188 (M)                          | 102                              |
| N       | 400 (M)                          | 182                              | 552 (M)                          | 33                               |
| Ave.    | 362.43                           | 75.43                            | 399.14                           | 45.29                            |

\*Subject A-L acquired the habit only after suggestion which was given as the result of apparent intense tension.

The letters in brackets indicate the sex of the subject concerned.

required by each subject. The subjects will be designated in terms of their group and the letter found in the first column. Thus the first subject in Group *A* will be called *A-A*, the second *A-B*, the first in Group *B* *B-A*, etc.

*b. Bases of choice during the no-solution period.* Two members of Group *B* continued the response acquired during the original learning situation throughout the 50 trials of the no-solution period, and two others



reversed their habit midway and maintained this reversed habit throughout the remainder of the 50 trials. No member of Group *A* persisted in the formerly established habit for more than 27 trials, the average being 9.2 as compared with 29.2 for the less concentrated punishment group. This difference is significant to a point beyond the 1 per cent level of certainty ( $t=4.679$  with 26 degrees of freedom). Probably, also, more shocks were required for the abandonment of the unsuccessful habit with 50 per cent than with 100 per cent punishment. The difference, yielding a " $t$ " of 2.011, attains the 5 per cent level of certainty. When the application of a habit resulted in punishment only 50 per cent of the time, more shocks were required for the abandonment of that habit than when every response was punished.

*c. Behavior patterns.* A number of examples of behavior patterns typical of frustrations were observed during the course of this study. But since examples of protocols will be presented when the main part of the experiment is discussed, none will be elaborated here. It is worth mentioning, however, that one subject (*A-N*) exhibited an exceptionally large amount of aggression directed toward the experimenter. He said, at different times, "You are malicious," "You're mean," "Darn you anyway," "You would enjoy driving a person crazy," and "I ought to knock you down."

*d. The number of trials required to form a position habit.* As can be seen in Table 1, the members of Group *A* required an average of 1.7 times as many trials to establish a position habit as did the members of Group *B*. However, because of the extremely wide variability of Group *A* learning scores, this difference is not significant ( $t=1.441$  with 26 degrees of freedom). In fact, the distribution of learning scores for this group does not appear to be normal. Although all but four members of Group *A* required fewer than 98 trials to establish the position habit, four subjects required more than 146 trials to learn. No member of Group *B* failed to learn within the first 102 trials. This difference, of slower learning by four members of Group *A* than by any member of Group *B*, is reliable to the 3.4 per cent level of certainty according to the chi-square test of independence.

The slow acquisition of the position habit by these four subjects cannot be attributed to below average learning ability since they required, on an average, 80.8 fewer trials to acquire the original habit than did the remaining subjects. These subjects also showed more stereotypy as evidenced by greater consistency of choice during the first two presentations of the series of combinations after the shift to a position habit situation. The four slow learners choose the same member of a pair on the two occasions more

frequently than did the normal learners.<sup>4</sup> The averages of 22.75 and 17.0 pairs, respectively, differ significantly;  $t=4.977$  with nine degrees of freedom. There was no overlapping of the two distributions.

The average number of trials required for the formation of the position habit by the members of Group *A* who learned normally was much the same as that for the members of Group *B*; the averages of 35.7 and 45.3, respectively, differ negligibly.

Thus our data suggests that Group *B* was composed of members from only one population, while the members of Group *A* belonged to two populations. One of these populations appears to be the same as that which makes up Group *B* while the other differs in rate of learning and stereotypy. This split of Group *A* was not apparent until after the subjects had been exposed to a period of concentrated punishment.

*e. Personality inventory comparisons.* Table 2 reveals a number of prob-

TABLE 2  
AVERAGE PERCENTILE SCORES ATTAINED ON THE BERNREUTER *Personality Inventory*  
BY INDIVIDUALS EXHIBITING VARIOUS FORMS OF BEHAVIOR

|                                                                          | B1-N  | B2-S  | B3-I  | B4-D  | F1-C  | F2-S  |
|--------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|
| Slow learners<br>(N=4)                                                   | 46.0  | 36.3  | 43.5  | 45.3  | 60.0  | 35.0  |
| Normal learners<br>(N=24)                                                | 41.1  | 51.0  | 40.7  | 58.9  | 47.9  | 56.4  |
| Subjects failing to<br>acquire original<br>habit (N=7)                   | 20.1  | 82.3  | 27.1  | 82.8  | 23.0  | 63.0  |
| Subjects failing to<br>maintain required<br>temporal controls<br>(N=10)* | 59.0  | 44.0  | 57.1  | 37.9  | 65.9  | 47.9  |
| Subjects maintaining<br>required temporal<br>controls (N=35)             | 37.6  | 55.4  | 38.4  | 62.1  | 44.3  | 55.2  |
| Average                                                                  | 42.24 | 53.00 | 42.49 | 57.76 | 49.11 | 53.64 |

\*Those subjects whose results have been discarded because of the presence of an interval of five or more days between two successive sessions.

<sup>4</sup>Determination of consistency was possible only when all of the pairs were responded to twice after the shift to a position habit situation and prior to the onset of the criterion trials. The term *normal learners* shall be used to designate those subjects who maintained the required temporal intervals between sessions and acquired the position habit in 111 or fewer trials. The normal learners in each group shall henceforward be referred to as constituting one sub-group, the slow learners as constituting the other.



able differences between the *Personality Inventory* scores attained by individuals exhibiting various forms of behavior. Because of the small groups involved and the wide variability in each group, none of the differences are significant. However, for the purpose of comparisons with results to be reported in the main part of this paper, it should be noted that the slow learners appear to be less self-sufficient and more sociable than the normal learners; that those failing to maintain the required interval between sessions scored relatively high in neurotic tendency and introversion, and are slightly less dominant and less confident than the average normal learner.<sup>5</sup>

#### 4. *Discussion of Procedure*

The results of this preliminary investigation are inadequate when considered in isolation. However, they make possible interesting comparisons with and provide additional evidence for some of the results to be reported in the main part of this paper. (a) It was suggested that whereas Group *B* contained only one population, Group *A* contained two. One of these populations appears to be equivalent to that of Group *B*, while the other differs in rate of learning and stereotypy. This split in Group *A* was not apparent during the original learning situation. (b) The subjects who failed to establish the required habit during the original learning situation exhibited noticeable stereotypy but none attained the criterion for complete abnormal

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<sup>5</sup>The six scales available for the Bernreuter *Personality Inventory* are described as follows:

"B1-N. A measure of neurotic tendency. Persons scoring high on this scale tend to be emotionally unstable. Those scoring above the 98th percentile would probably benefit from psychiatric or medical advice. Those scoring low tend to be very well balanced emotionally.

"B2-S. A measure of self-sufficiency. Persons scoring high on this scale prefer to be alone, rarely ask for sympathy or encouragement, and tend to ignore the advice of others. Those scoring low dislike solitude and often seek advice and encouragement.

"B3-I. A measure of introversion-extroversion. Persons scoring high on this scale tend to be introverted; that is, they are imaginative and tend to live within themselves. Scores above the 98th percentile bear the same significance as do similar scores on the B1-N scale. Those scoring low are extroverted; that is, they rarely worry, seldom suffer emotional upsets, and rarely substitute day dreaming for action.

"D4-D. A measure of dominance-submission. Persons scoring high on this scale tend to dominate others in face-to-face situations. Those scoring low tend to be submissive.

"F1-C. A measure of confidence in oneself. Persons scoring high on this scale tend to be hamperingly self-conscious and to have feelings of inferiority; those scoring above the 98 percentile would probably benefit from psychiatric or medical advice. Those scoring low tend to be wholesomely self-confident and to be very well adjusted to their environment.

"F2-S. A measure of sociability. Persons scoring high on this scale tend to be non-social, solitary and independent. Those scoring low tend to be sociable and gregarious" (3, p. 1).

fixation. (c) The members of Group *B* retained their original habit after the introduction of the no-solution period for a greater number of trials than did those of Group *A*. And (d) it was suggested that there is a possible relationship between *Personality Inventory* scores and the form of behavior exhibited.

The procedure was abandoned without sufficient evidence for definite conclusions for two reasons. (a) It was difficult to get coöperation in keeping secret the experimental procedure for so long a period. Failure to respond to appeals for coöperation may well be an evidence of frustration, and the long period required for the original learning produced temporary frustration behavior in many instances. Discussions with the subjects at the close of the final session revealed that two knew that at a stage late in the experiment there was to be a change in the problem to be solved. Since neither of these subjects acquired the original habit, their foreknowledge did not affect the results reported, but further cases might well increase the magnitude of the difficulty. (b) The large number of sessions per subject made invariability of the interval between sessions impossible in too large a percentage of instances.

To overcome the difficulties inherent in this method and to attain the same goals by a shortened procedure, the original learning situation has been omitted during the main body of the experiment.

#### D. MAIN EXPERIMENT

##### 1. *Methods of Study*

a. *Apparatus.* The apparatus employed for this experiment was the same as that used for the preliminary investigation and described in Section C.

##### b. *Procedure.*

(1). *Preliminary arrangements.* The 135 subjects employed were obtained from three elementary psychology courses at the University of Michigan. They were divided randomly into four groups of unequal size but with the ratio of the sexes held relatively constant.

The subjects were first brought together in small groups and given the Bernreuter *Personality Inventory*. The directions and forms used were the same as those employed in the preliminary investigation and described in Section C.

The stimulus cards were presented in the same three sequences of 36 pairs as employed during the preliminary investigation. However, in order to



prevent differential rates of learning resulting from variation in the cards presented immediately after the change from a no-solution to a position habit situation, the last eight pairs were omitted during the third sequence of the first session for Group II. This caused the series of pairs presented after the shift to a position habit situation to be the same throughout. Times per group of 10 choices were obtained by the use of a stop watch.

For Group II effort was made to hold the first experimental period to 100 choices, while for the other groups, and for this group during the second session, approximately 108 trials were to be completed. When the subject worked too slowly to make this possible, at least 20 of the arbitrary punishment trials were included on the same day as the shift to a position habit situation. Efforts were made to have a session every other day, but results were retained when two consecutive days were employed and when two days elapsed between sessions. No greater variation was allowed.

The directions given to the subject at the opening of the first experimental session and the attitude maintained by the experimenter were the same as those employed in the preliminary study and described in Section C.

The subjects were put into a no-solution situation in which no specific response was demanded. This period consisted of 50 trials for Groups I, III, and IV, and 150 trials for Group II. Punishment arbitrarily followed 75 per cent of the choices made by Group I, 25 per cent of those made by Groups II and III, and 0 per cent of those made by Group IV. The 25 per cent and 75 per cent values were selected so as to render approximately equal the change in the percentage of punishment when the position habit situation was instituted. The durations of the no-solution period were selected so as to equate the number of shocks received by members of Groups I and II, and the number of choices made by Groups I and III. The judgment immediately preceding the shift to a position habit situation was consistently punished for Groups I, II, and III.

At the conclusion of the no-solution problem and with no warning to the subject, the door on the left was made always correct so that the subject could avoid punishment by establishing a position response. The subject received punishment whenever he chose the door on the right. The criterion was 15 consecutively correct choices. After the criterion had been reached, the subject was asked the basis of his selection, and further trials were allowed if needed for the formulation of the correct generalization.

## 2. Results

a. *The establishment of a position habit.* Table 3 shows the number of trials required by the members of each of the four groups to reach the onset of the criterion trials. The subjects will be designated, as they were in the preliminary investigation, in terms of their group and the letter found in the first column.

(1). *The nature of the distribution curves.* When the numbers of trials are plotted in the histogram form (Figure 3), the distribution of scores made by the members of Group I appears to be bimodal.<sup>6</sup> This appearance of bimodality is corroborated, according to Table 4, by computed chi-square values. The distribution of the reciprocals of the scores attained by the members of Group I differs significantly from a normal distribution. For no other group are there over 75.3 chances out of 100 that the distribution lacks normality. This is true despite the fact that the small number of cases in each of these three groups would inflate the chi-square values.

The distribution histograms have been presented in terms of the number of trials required to form the habit, while the chi-square values have been computed using reciprocals. This was done because of greater ease in observation of the results when the number of subjects is plotted against the number of trials required for each subject to form the position habit. However, reciprocals were used in the computations since the number-of-trial type of presentation has been demonstrated as generally yielding a skewed distribution.

The abnormality of the Group I distribution is attributable largely to a dearth of individuals scoring between 100 and 129, while 11 individuals either required more than 128 trials to learn or failed to learn within the time allowed.

Of the two subjects who failed to learn, one (*I-O*) unquestionably revealed an abnormal fixation. One trial before the conclusion of the arbitrary punishment period she began to select the door on the right and continued to do so for 80 consecutive trials. The results of a greater number of trials would have been of value, but it was felt advisable not to subject the subject to further frustration.

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<sup>6</sup>The results of the two subjects who failed to learn have been included in the class interval with its lower limit at 201 trials. This act is justifiable since one of these subjects (*I-L*) had still failed to solve the problem after 233 trials and the other (*I-O*) had established an abnormal fixation which she was continuing at the end of 70 trials. Maier and his students (21, 22) have shown that a response which is abnormally fixated is extremely resistant to change. They (22) found that seven out of 10 fixated animals retained their response throughout a four or more month vacation and during a lengthy series of tests involving both one- and two-window situations.

TABLE 3

THE NUMBER OF TRIALS REQUIRED TO FORM A POSITION HABIT AFTER VARYING CONDITIONS OF ARBITRARY PUNISHMENT, CRITERION TRIALS NOT INCLUDED

| Subject | Group I  | Group II | Group III | Group IV |
|---------|----------|----------|-----------|----------|
| A       | 95 (M)   | 59 (M)   | 31 (F)    | 14 (F)   |
| B       | 76 (M)*  | 111 (M)  | 79 (F)    | 60 (M)   |
| C       | 40 (M)   | 84 (M)   | 8 (F)     | 26 (F)   |
| D       | 192 (F)  | 67 (M)   | 23 (F)    | 24 (M)   |
| E       | 41 (M)   | 59 (F)   | 48 (F)    | 51 (M)   |
| F       | 68 (M)   | 38 (F)   | 63 (F)    | 24 (M)   |
| G       | 200 (M)  | 21 (M)   | 37 (F)    | 87 (F)   |
| H       | 147 (F)  | 69 (M)   | 63 (M)    | 127 (M)  |
| I       | 147 (M)  | 23 (M)   | 181 (M)   | 13 (F)   |
| J       | 26 (M)   | 58 (M)   | 31 (M)    | 37 (F)   |
| K       | 68 (F)   | 16 (M)   | 25 (F)    | 89 (F)   |
| L       | ** (M)   | 41 (M)   | 44 (M)    | 8 (M)    |
| M       | 47 (M)   | 1 (F)    | 30 (M)    | 87 (M)*  |
| N       | 31 (M)   | 40 (M)   | 45 (M)    | 29 (M)*  |
| O       | ** (F)   | 46 (M)   | 38 (M)    | 29 (F)   |
| P       | 47 (M)   | 30 (M)   | 50 (M)    | 49 (M)   |
| Q       | 66 (M)*  | 33 (F)   | 58 (M)*   | 41 (M)   |
| R       | 67 (M)   | 51 (F)   | 107 (M)   | 14 (M)   |
| S       | 170 (M)  | 12 (M)   | 13 (M)    | 25 (M)   |
| T       | 20 (F)   | 34 (M)   | 36 (M)    |          |
| U       | 24 (F)   | 35 (M)   | 37 (M)    |          |
| V       | 141 (F)  | 36 (M)   | 66 (M)    |          |
| W       | 19 (F)   | 93 (F)   | 31 (M)    |          |
| X       | 43 (M)   | 99 (F)   | 40 (F)    |          |
| Y       | 8 (M)    | 7 (F)    | 15 (M)    |          |
| Z       | 147 (F)* | 68 (F)   | 21 (M)    |          |
| AA      | 27 (M)   | 16 (F)   | 18 (M)    |          |
| AB      | 57 (F)   | 52 (M)   | 20 (M)    |          |
| AC      | 100 (M)  | 40 (F)   | 75 (F)    |          |
| AD      | 34 (F)   |          |           |          |
| AE      | 48 (M)   |          |           |          |
| AF      | 6 (F)    |          |           |          |
| AG      | 42 (F)   |          |           |          |
| AH      | 129 (M)  |          |           |          |
| AI      | 41 (M)   |          |           |          |
| AJ      | 29 (M)   |          |           |          |
| AK      | 19 (M)   |          |           |          |
| AL      | 33 (F)   |          |           |          |
| AM      | 24 (M)   |          |           |          |
| AN      | 192 (M)  |          |           |          |
| AO      | 31 (M)   |          |           |          |
| AP      | 35 (M)   |          |           |          |
| Ave.    | 69.4†    | 46.2     | 46.0      | 43.9     |

\*Indicates failure to state the nature of the habit in its simplest form.

\*\*Indicates failure to learn.

†In the calculation of this mean the results of the subjects who failed to learn have been disregarded.





FIGURE 3

DISTRIBUTIONS OF THE NUMBER OF TRIALS REQUIRED TO ESTABLISH A POSITION RESPONSE AFTER EXPOSURE TO VARIOUS NO-SOLUTION SITUATIONS: CRITERION TRIALS NOT INCLUDED

TABLE 4  
CHI-SQUARE TESTS OF GOODNESS OF FIT

| Group | Chi-Square | Degrees of freedom | Level of significance |
|-------|------------|--------------------|-----------------------|
| I     | 10.245*    | 1                  | Less than 1%          |
| II    | 1.904      | 1                  | 17.5%                 |
| III   | 1.373      | 1                  | 24.7%                 |
| IV    | 1.677      | 1                  | 19.7%                 |

\*This figure was calculated for the 40 subjects who succeeded in forming the position habit. If the other two subjects are regarded as having scores at the mid-point of the highest class interval, the chi-square value is raised to 10.471 with one degree of freedom.

Initially, she expressed fear of the shock and offered a description of a severe shock during early life as an explanation. Early during the first session, the experimenter made an effort to convince her to open the doors instead of turning the handles only a part of the way, but she continued to resist and efforts were soon abandoned. During this session, she made only 30 decisions with an average time of 14.7 minutes for each group of 10. The rate of choice at the opening of the second session remained much the same, but the onset of the "fixation" response was marked by a sudden increase in the speed of decision. The average time per group of 10 decreased to 4.9 minutes. Also the subject had reached the point of voluntarily opening the door on a number of occasions. The reductions in decision time and in resistance to opening the door supported Maier's contention (21) that a fixation serves as an adjustment to the situation.

Another subject (*I-L*) failed to learn in 233 trials and reported the same method of selection on three occasions each 50 choices apart.<sup>7</sup> However, examination of the data fails to indicate exact conformity of choices. He responded in the same manner to 21 pairs on each of their last three occurrences, consistent erroneous choices being made in eight instances. This is greater than would be expected if chance were operating or if the pattern of choice were being changed as soon as it was found to be erroneous. Only 9.0 pairs would, by chance, be responded to in the same manner on each of three consecutive occurrences and only 4.5 pairs should be consistently missed. He had two pairs wrong on each of their last seven presentations; chance is .28 pair.

There is, then, an indication of a tendency to repeat the same response to each pair, but the trend is not sufficient to offer conclusive evidence for the presence of a complete fixation. However, the subject described a complex method of selection, and he may have made some errors in its application. He worked very rapidly. The contention that we are dealing with errors of choice rather than with the appearance of secondary criteria is supported by the fact that the shifts in response were as frequently in the direction of from right to wrong as from wrong to right.

No member of Group II either failed to learn or required as many trials to learn as did 11 members of Group I, and only one subject required more than 100 trials. Examination of the results of Group III reveals one case with a score above 126 (namely 181) and one other slightly over 100. One member of Group IV required 127 trials to learn.

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<sup>7</sup>He voluntarily stated his method at the time of the 130th position habit situation trial and was asked for it at the time of the 180th, and 230th trials.

This difference is significant. A larger proportion of the members of Group I, than of Group II, III, and IV combined, either failed to acquire the habit or acquired it very slowly. The chi-square test of independence yields a value of 15.535; the 1 per cent probability of the null hypothesis value is only 6.635. Comparing Groups I and II, the members of which received equal numbers of shocks during the no-solution period, a chi-square value of 9.0123 is obtained which is also reliable to the 1 per cent value. Concentrated punishment slows the formation of a discrimination learning habit in a larger percentage of instances than does punishment of equal intensity and equal quantity distributed over a larger number of trials.

(2). *The number of trials required to form a position habit.* In view of the abnormality of the distribution of Group I scores, averages cannot be compared. However, since the deviation from normal appears to be one of bimodality, a comparison of the groups, excluding the cases requiring 127 or more trials, appears to be in order. When this is done, averages for the normal learners of 42.3, 46.2, 41.1, and 39.3, respectively, are obtained. The "*F*" value of only .45 is adequate evidence that none of the differences are significant (the 5 per cent value of 102 and three degrees of freedom is 8.56).

These averages correspond closely to those found during the preliminary investigation and reported in Section C. In fact, no difference obtained during the course of these studies<sup>8</sup> attains the 20 per cent level of certainty.

*b. Stereotypy of response.* Forty-two subjects learned sufficiently slowly to make possible a comparison of the consistency of choice at the time of and shortly after the shift to a position habit situation. Consistency was measured in terms of the identity of response during two consecutive presentations of the 36 pairs.<sup>9</sup>

The members of the slow learning sub-group chose the same member of a pair on the two occasions more frequently than did the normal learners. The averages of 27.2 and 19.3 of the total of 36 pairs differ to a point beyond the 1 per cent level of certainty: "*t*" equals 6.766 with 40 degrees of freedom. As can be seen in Figure 4, there is little overlapping of the two distributions. The average consistency of choice exhibited by the normal

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<sup>8</sup>In one of the exploratory studies, not described in this paper, 10 subjects were, after being given the same directions as those used in this study, immediately put into a position habit situation. They required an average of 34.6 trials to establish the required response.

<sup>9</sup>That is, during the first presentation of the second and third sequences of pairs for Groups I, III, and IV and the second presentation of the same sequences for Group II.



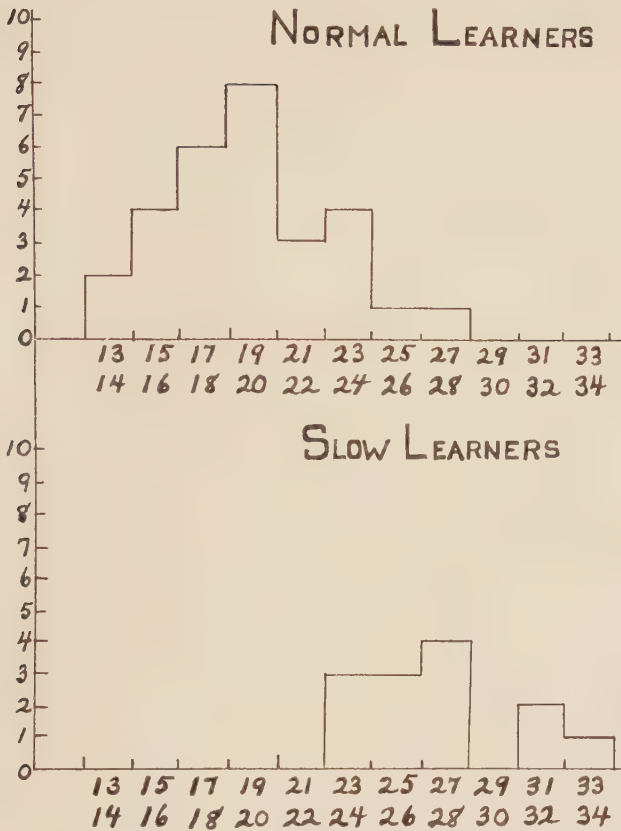


FIGURE 4

A COMPARISON OF CONSISTENCY OF CHOICE AS A RESULT OF TWO PRESENTATIONS OF THE SERIES OF 36 PAIRS

learners corresponds closely to that which would be expected if the pattern of choice were being changed as soon as it was found to be erroneous. On the other hand, the slow learners showed a definite tendency toward the repetition of identical responses; a tendency toward stereotypy of response.

The relationship between the number of trials required to establish the position habit and the degree of consistency of choice is not linear. Although there is a significant difference between the slow and normal learners, there are no significant relationships within the sub-groups. The rank order coefficients of correlation are .272 ( $PE_p=.131$ ) for the normal learners and  $-.270$  ( $PE_p=.182$ ) for the slow learners. Neither value is significant,

and the second is in the opposite direction of that which would be expected on the basis of the difference in the average consistency of choice of the two sub-groups.

*c. Behavior protocols.* The appearance of patterns of behavior which might be interpreted as indicative of frustration was not related to any considerable degree to the number of trials required to form the position habit. However, this type of behavior pattern was not found in the case of any individual who learned during the first session, and there were very few cases of its appearance in any but the 75 per cent punishment group.

(1). *Examples of protocols obtained from slow learning members of Group I.* Subject *I-L*, mentioned above as presenting some evidence of fixation, coöperated, at least outwardly, to a very high degree. However, soon after the opening of each session he became rather glum and his initial talkativeness disappeared. His remarks early during the sessions were lacking in any indication of frustration. Initially, he expressed fear of shock and dropped the door whenever a shock was received. This failure to catch the doors continued for almost one and one-half hours; for approximately the same period as that during which he felt that he was changing his method periodically. After this period, the shock seemed to be less distasteful. He made more rapid choices and caught the door after every choice.

*I-D*, by the 40th trial on the first day, was continuously holding her head and her face was very red. She began to cry at the time of the 80th trial and continued to do so during the remaining 20 trials of the session. The second session was concluded after the 45th trial, five trials after she had started to cry. Throughout the entire session, she said "ouch" after most errors and continuously remarked about her feeling of hopelessness. The third session was opened by a sudden appearance of interest. She remarked, "It must be something awfully simple, cause I've tried everything difficult. Come on ——— you can do this. I dream of this at night." Solution followed soon after this remark. Later, a friend reported that the subject had said that she had been too much affected to go on with more advanced courses in psychology.

Subject *I-G*, at the time of the 37th choice, accused the experimenter of changing the pattern and by the 61st trial was asking frequently, "How long does this take?" "Do I have to do this?" etc. For approximately 30 choices he worked very rapidly with apparent apathy and then seemed to experience a revival of interest in the situation as evidenced by vocalization of the basis of his decisions. At the conclusion of the first session, he again expressed dislike of the situation and asked if it was necessary for him to

TABLE 5  
 PROTOCOL OF SUBJECT I-AN

| <i>Choice</i> | <i>First session</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p>6. "Has it anything to do with hands?"</p> <p>29. "Can't I just point?" He expressed dislike of the shock then made an error. "Hell!"</p> <p>30. "How long does this last? Can I point to them? I can't learn when I am worrying more about the shock than the learning."</p> <p>34. (In response to a request to be less rough with the apparatus), "Yes, you're right, I'm batting the bar not holding the knob. Do I have to hold onto the knob?"</p> <p>35. "How long does this take?"</p> <p>36. "That was wrong, it buzzed." S finally agreed to quit hitting the bar or knob and to take hold of the knob. However, he pushed very slowly so as to get the first feeling of shock then refused to go further.</p> <p>42. S hit the knob, "It messes up my train of thought to push the knob. Is this part of the work in the course? Do you grade us for it?"</p> <p>43. S refused to continue the experiment but finally agreed to return later for a second session.</p>                                                                                 |
| <i>Choice</i> | <i>Second session</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|               | <p>1. "Do I really have to take the shock?" He reached for the knob then pulled back. "Oh! I hate to touch it."</p> <p>36. "Are you sure that you are consistent and don't change it at all?" (ignored)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>Choice</i> | <i>Third session</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|               | <p>5. The subject claimed that both figures had been wrong at some time, listed some methods which he had used and said, "Is there something like a small light on one knob?" He looked, "Did you write that fool remark down, of course there isn't. Is all that I need visible out here, I'm all mixed up."</p> <p>8. "The shock seems stronger, did you change it today?" (E, "No.")</p> <p>9. "I'm using two theories but they are contradictory. That's funny which one do you suppose is right?"</p> <p>13. "Has anyone failed to solve it?" (ignored) "You probably will have to tell me. Did anyone solve it?" (E, "Yes.")</p> <p>— The subject spent the remainder of the session discussing his views of the Jewish people. He considers them cheaters and wishes to know whether E considers them brilliant. E asked how he knew that she is not Jewish and received the answer that he is certain that she is not, but that he would talk that way even if he did not know. S was very disgruntled when E said that many of her friends were Jewish.</p> |

return. He started the second session with the method followed during the period of verbal statement of the reason for each choice and continued to use it with very minor modifications for approximately 75 trials, often repeating the phrase, "I'm completely disillusioned." The third session was marked by the appearance of more rapid shifts from one pattern to another.

Subject I-Z reached the criterion without arriving at the generalization. Initially, she talked a good deal but soon reached the point of working very quietly. At the time of the 29th trial, she asked, "Is there really something you can figure out to this thing?" Ten trials before the onset of the criterion



trials, she said, "Obviously it isn't the doors," and after the criterion had been reached, she stated the reasons for a number of choices in the following manner: "circle, not a circle, guess, size and color, start of different size, side, as good as any, and circle." Since it was impossible to make another appointment following the correct interval, no additional trials were run in an effort to get her to arrive at the correct generalization.

(2). *Protocols of members of Group I who learned normally.* Turning to the members of the 75 per cent punishment group who required fewer than 101 trials to learn, *I-K* at the time of her 24th choice said, "This is the most complex puzzle that I ever took part in. I'm generally good at puzzles." At her 46th choice she expressed the belief that there was no solution and said that she was relying upon instinct. The remainder of the session was marked by a stated failure to make any effort toward solution. The second session, however, was approached with renewed interest and the solution was soon attained.

Subject *I-AC* early expressed his dislike of the situation, saying that it was all foolishness and that he would not return for the second session if asked to do so. He asked whether the experimenter had designed the experiment by herself and said, "What a malicious individual you must be." Psychology also underwent criticism as being a "foolish" and "dumb" field in which he certainly did not wish to take any further work.

Subject *I-R* asked at the time of the sixth choice if he were unusually dull and soon (Choice 18) said that he was picking the one which he considered to be wrong. Later (Choice 68), he became angry and refused for a time to put away a match box with which he wished to open the doors. After this resistance had been overcome and two wrong choices had been made, he removed one of the wrist bands and would not allow it to be returned to his arm. During this session a total of 80 trials were completed. The subject appeared for his second session with an apologetic air and soon arrived at the solution.

*I-B* reached the criterion at the end of 91 trials but could not state the correct generalization and immediately began to make errors when asked to state the basis of each choice. The criterion was not again reached until the conclusion of the 207th choice at which time he said that he had learned all of the pairs.

*I-Q* stated the generalization in the following manner: "If both had white backgrounds, I picked the one on the left. If both were black, I took the one on the left. If there was a black ground on the left and a white on the right, I picked the black, and if there was a white on the left and

a black on the right, then I took the white." When asked whether this would reduce to a continuous choice of the left, he said that it would not and refused to be convinced until shown a written statement of the principle which he had followed.

(3). *Examples of protocols of members of Groups II, III, and IV.* Three members of these groups were unable to state the correct generalization after they had met the criterion. Subject *III-Q* stated a complex theory, parts of which were contradictory to other parts, and said that he did not know why one rule applied and not another. Subject *IV-M* made correct choices 50 times consecutively and said that his choices were entirely determined by chance. He said, "On the first day I was rather angry and annoyed but not exactly upset. On the second day it was a little better, but I was still bothered when wrong." *II-C*, at the conclusion of the first session, said that he had not been trying but that he would do so during the following session.

(4). *Analysis of behavior protocols.* Table 6 attempts an analysis of

TABLE 6  
PERCENTAGE OF SUBJECTS EXHIBITING VARIOUS FORMS OF BEHAVIOR

|                                                                  | Group I       |                 | Total | Group II | Group III | Group IV |
|------------------------------------------------------------------|---------------|-----------------|-------|----------|-----------|----------|
|                                                                  | Slow learners | Normal learners |       |          |           |          |
| Negative self-feeling                                            | 9.1           | 0               | 2.4   | 0        | 0         | 0        |
| Feelings of hopelessness and apathy                              | 36.4          | 3.2             | 11.9  | 3.4      | 3.4       | 0        |
| Anger                                                            | 9.1           | 6.5             | 7.1   | 0        | 0         | 5.3      |
| Aggression or antagonism                                         | 9.1           | 3.2             | 4.8   | 0        | 0         | 0        |
| Stereotypy of remark                                             | 9.1           | 0               | 2.4   | 0        | 0         | 0        |
| Extreme emotionality                                             | 9.1           | 0               | 2.4   | 0        | 0         | 0        |
| Resistance                                                       | 18.2          | 6.5             | 9.5   | 0        | 0         | 0        |
| Reported continual adherence to an erroneous principle of choice | 18.2          | 0               | 4.8   | 0        | 0         | 0        |

the percentage of subjects in each group exhibiting behavior which is probably indicative of frustration. Although such an analysis is necessarily arbitrary, only those cases have been included where there can be little doubt of the significance of the subject's behavior. All of the behavior patterns commonly listed as indicative of frustration, abnormal fixation, aggression, regression, and resignation, are probably represented by one or more of the categories.

The table reveals a definite concentration of these behavior patterns in Group I with a slightly larger percentage among the slow than among the

normal learners. For example, aggression was shown by two members of Group I and by no member of any other group, and feelings of hopelessness and apathy were exhibited by five members of Group I and by only two members of the other groups combined.

*d. Principles adopted by the members of Group IV during the no-solution period.* The writer expected that the members of Group IV, who were initially allowed to establish any desired habit, would adopt one involving a simple principle of choice. However, nine subjects (*IV-A*, *IV-C*, *IV-F*, *IV-G*, *IV-H*, *IV-M*, *IV-N*, *IV-P*, and *IV-Q*) adopted theories of a very complex nature. For example, Subject *IV-M* said that a black circle or a square on the left was predominant, that when there were two circles he selected the smaller, that a gray on the left was correct, and that a gray circle and gray square took precedence over most other figures. Four subjects (*IV-D*, *IV-E*, *IV-I*, and *IV-S*) selected patterns of an intermediate level of complexity and six adopted simple habits. Of the six simple habits developed, one was on the basis of size and five of symmetry and balance.

*e. Comparisons of slow and normal learners.*

(1). *Sex.* Of the 11 members of Group I who required more than 128 trials to form the position response, six were men and five were women. Since there were twice as many men employed as women, this would seem to indicate that the female subjects were the more susceptible. However, the difference is statistically negligible: the obtained chi-square is only .933 with one degree of freedom ( $P=34.5$ ). Also, the members of the other groups who learned very slowly were both men.

(2). *Rate of choice.* The studies which have indicated that increased attention is one of the mechanisms responsible for the accelerating effect of punishment upon learning (33, 26) suggest the question of temporal correlates in this study. As can be seen in Table 7, there is no significant difference between the rate of choice of normal and slow learning members of Group I. However, there is a relationship, indicated by a product moment correlation coefficient of  $-.388$  ( $PE_r=.0527$ ), between the average time required for a series of 10 judgments and the number of trials required for the establishment of a position habit among the 106 subjects who learned normally. So long as frustration did not occur, slow judgments, probably indicative of careful attention, resulted in learning in fewer trials than did more rapid judgments.

(3). *Bernreuter Personality Inventory results.* Table 8 presents a comparison of the Bernreuter scores obtained by normal and slow learning members of Group I. For convenience in observation, the means have been



TABLE 7  
AVERAGE TIME REQUIRED BY THE MEMBERS OF GROUP I FOR EACH GROUP OF TEN CHOICES

|                                     | Mean<br>normal<br>learners | Mean<br>slow<br>learners | Diff. | " <i>t</i> "<br>(d.f. 40) | Level of<br>significance |
|-------------------------------------|----------------------------|--------------------------|-------|---------------------------|--------------------------|
| During the no-solution period       | 215.2                      | 258.9                    | 43.7* | 1.572                     | 12.0%                    |
| During the position habit situation | 186.8                      | 193.3                    | 6.4   | .626                      | 53.2%                    |
| During the entire experiment        | 205.1                      | 209.3                    | 4.2   | .212                      | 83.2%                    |

\*The extreme resistance shown by Subject *I-O* is responsible for this difference. When the results of this subject are eliminated the difference is small (1.5) and is reversed in direction.

TABLE 8  
A COMPARISON OF THE BERNREUTER PERSONALITY INVENTORY SCORES OBTAINED BY NORMAL AND SLOW LEARNING MEMBERS OF GROUP I

| Trait | M <sub>1</sub> * | M <sub>2</sub> * | Differ-<br>ence | X <sup>2</sup><br>(d.f. 4) | % level of<br>significance |
|-------|------------------|------------------|-----------------|----------------------------|----------------------------|
| B1-N  | 34.6             | 30.6             | 4.0             | 2.081                      | 72.6                       |
| B2-S  | 36.4             | 59.6             | 23.2            | 17.365                     | 0-1                        |
| B3-I  | 34.8             | 32.9             | 1.9             | 1.421                      | 83.9                       |
| B4-D  | 66.5             | 69.8             | 3.3             | 2.062                      | 72.4                       |
| F1-C  | 49.3             | 37.6             | 12.0            | 5.632                      | 23.2                       |
| F2-S  | 35.8             | 56.5             | 20.6            | 14.471                     | 0-1                        |

\*M<sub>1</sub>=the mean percentile score for the slow learners.

M<sub>2</sub>=the mean percentile score for the normal learners.

expressed as percentile scores. However, computation of the significance of the difference was performed for each sex separately using raw scores and the Fisher "*t*" technique. The probabilities so obtained were then combined by changing them into chi-square values and adding. The subjects who learned normally are more self-sufficient and less sociable than the slow learners.

The relationship between the rate of learning and the *Personality Inventory* scores is non-linear. Although there is a significant difference between the slow and normal learners, there are, according to Table 9, with the possible exception of the F2-S scores of the frustrated sub-group of Group I, only negligible relationships within each sub-group. This non-linear relationship together with the bimodal nature of the distribution and the non-linear stereotypy and rate of choice relationships, discussed above evidence a division of Group I into two populations.

*f. Bernreuter correlates of "quitting behavior."* The results of a total of 16 subjects, constituting 19.2, 12.9, 6.9, and 5.0 per cent of the total membership of Groups I through IV, respectively, were eliminated from the

TABLE 9  
CORRELATIONS, WITHIN EACH SUB-GROUP, OF BERNREUTER PERSONALITY INVENTORY  
SCORES AND TRIALS REQUIRED TO LEARN

|                                         | Group I | Normal learners<br>Group II | Group III | Group IV | Slow<br>learners<br>Group I |
|-----------------------------------------|---------|-----------------------------|-----------|----------|-----------------------------|
| B2-S                                    |         |                             |           |          |                             |
| rho                                     | -.044   | -.010                       | -.174     | -.256    | -.445                       |
| PE <sub><math>\rho</math></sub>         | .133    | .136                        | .134      | .159     | .179                        |
| $\rho/PE_{\rho}$                        | .33     | .07                         | 1.30      | 1.61     | 2.49                        |
| Chances of<br>significance<br>(per 100) | 59      | 56                          | 81        | 86       | 95                          |
| F2-S                                    |         |                             |           |          |                             |
| rho                                     | .135    | .046                        | .119      | -.079    | -.567                       |
| PE <sub><math>\rho</math></sub>         | .131    | .136                        | .137      | .165     | .148                        |
| $\rho/PE_{\rho}$                        | 1.03    | .34                         | .87       | .48      | 3.83                        |
| Chances of<br>significance<br>(per 100) | 76      | 59                          | 72        | 63       | 99.5                        |

data because of overly long intervals between sessions.<sup>10</sup> When the Bernreuter scores of these subjects are compared with those of the subjects whose data has not been reported, it is found that differences certain to the 1 per cent level of confidence exist in the raw scores obtained on the neurotic tendency, introversion, dominance, and confidence scales. As can be seen in Table 10, the subjects whose results were eliminated because of overly long intervals between sessions score higher in neurotic tendency, are more introverted, less dominant, and less confident than the remainder of the subjects.

It is realized that failure to come and refusal to make an appointment may have been unavoidable at times. However, they were probably, for the most part, indicative of frustration. This contention is supported by the personality correlates reported above, by a commonly expressed disinclination to continue, by the presence of behavior patterns typical of frustration, and by the difference in coöperativeness between the first and subsequent sessions.

<sup>10</sup>A larger percentage of subjects from Group I than from any other group was eliminated despite the fact that the long arbitrary punishment period required of the members of Group II necessitated a minimum of two experimental sessions. This provides additional evidence for a distinction between the results obtained from the different groups. Also, when these subjects completed the experiment, always after a lapse of at least one week, scores of over 127 were obtained on only three occasions, all within the 75 per cent punishment group. Thus the trend is much the same as that of the data retained and the differences are still further increased.

TABLE 10  
A COMPARISON OF BERNREUTER PERSONALITY INVENTORY SCORES OF SUBJECTS MAINTAINING AND FAILING TO MAINTAIN THE REQUIRED INTERVAL BETWEEN EXPERIMENTAL SESSIONS

|                                                     | B1-N    | B2-S  | B3-I   | B4-D    | F1-C   | F2-S  |
|-----------------------------------------------------|---------|-------|--------|---------|--------|-------|
| Mean percentile score of retaining subjects (N=112) | 41.11   | 50.31 | 40.82  | 61.30   | 49.82  | 51.26 |
| Mean score of excluded cases (N=16)                 | 65.88   | 40.63 | 60.25  | 38.44   | 71.00  | 60.06 |
| Difference                                          | 24.77   | 9.68  | 19.43  | 22.86   | 21.18  | 8.80  |
| Chi-Square                                          | 18.421* | 5.972 | 13.312 | 18.421* | 15.127 | 4.768 |
| Level of significance                               | 0-1%    | 20.1% | 1%     | 0-1%    | 0-1%   | 31.4% |

\*Both "t" scores exceeded the 1 per cent probability value thus the chi-square is the maximal which could be computed with the "t" table employed by the writer. It is to be regarded as smaller than the data warrants.

The reported chi-square values were computed by the method described in Section D.

In very few instances did the subject fail to make the first appointment at the time desired by the experimenter, and in only one instance did he fail to keep this appointment.

*g. Bernreuter correlates of behavior typical of frustration.* Table 11 reveals that the subjects who exhibited behavior typical of frustration but relieved their tensions and learned in 111 or fewer trials are the best adjusted of any group. They show the least neurotic tendency and the most self-sufficiency, are extroverted, dominant, and confident. On the other hand, those subjects who showed such behavior and still formed the habit very slowly are slightly less well adjusted than the remaining members of the slow learning sub-group.

## E. DISCUSSIONS AND CONCLUSIONS

### 1. Punishment as a Frustrating Agent

The results of this study indicate that Maier and Klee (23) are right when they maintain that punishment may act as a frustrating agent, and that the effect appears in humans as well as in rats. All of the possible criteria of frustration; slow learning, "quitting behavior," and behavior protocols revealing aggression, regression, resignation, or stereotypy of remark; indicate that concentrated punishment in a no-solution situation is more frustrating than is punishment of a less concentrated sort even if the number of shocks is equal. However, complete fixation was not observed sufficiently frequently to make possible a comparison of the groups. Only

TABLE 11  
COMPARISONS OF THE BERNREUTER PERSONALITY INVENTORY SCORES OF THE MEMBERS  
OF GROUP I EXHIBITING VARIOUS FORMS OF BEHAVIOR

|                                                                           | Mean percentile scores |                |              | B4-D            | F1-C               | F2-S |
|---------------------------------------------------------------------------|------------------------|----------------|--------------|-----------------|--------------------|------|
|                                                                           | B1-N                   | B2-S           | B3-I         |                 |                    |      |
| Subjects learning slowly (N=11)                                           | 34.6                   | 36.4<br>(2)    | 34.8         | 66.5<br>(3)     | 49.3<br>(2)        | 35.8 |
| Subjects learning slowly and failing to exhibit frustrated behavior (N=6) | 27.8<br>(2)            | 43.9           | 30.8         | 67.3            | 37.9<br>(4)        | 39.1 |
| Subjects learning slowly and exhibiting frustrated behavior (N=5)         | 42.8                   | 27.4<br>(1)    | 39.6         | 65.6            | 63.0<br>(3*)       | 31.8 |
| Subjects exhibiting frustrated behavior but learning readily (N=5)        | 8.6<br>(1*)            | 69.0<br>(1, 2) | 8.8<br>(1*)  | 88.8<br>(1*)    | 9.8<br>(1*, 2, 3*) | 56.2 |
| Subjects exhibiting "quitting behavior" (N=10)                            | 66.1<br>(1*, 2)        | 39.9           | 61.7<br>(1*) | 37.5<br>(1*, 3) | 70.7<br>(1*, 4)    | 55.0 |

The numbers in parenthesis signify differences significant to the 5 per cent level of certainty; those followed by asterisks are significant to the 1 per cent level. As an example of application, there is a difference significant to the 1 per cent level of certainty in B1-N between those subjects who exhibited frustrated behavior and learned readily and those subjects who exhibited "quitting behavior."

one of the college students employed during the course of this investigation was, without question, completely fixated. A second subject gave introspective reports indicating that he was continually employing the same unsuccessful method of choice, but he did not consistently choose the same member of each pair.

The subjects employed in this study appear to belong to two distinct populations. The tested members of one of these populations established a position habit in 111 or fewer trials after the introduction of the position habit situation. During the period of the position habit situation, they selected the same member of each pair on two consecutive presentations of the 36 pairs approximately as frequently as would be expected if chance were operating or if they were changing their bases of choice whenever they made an error. The tested sample from the second population required 127 or more trials to learn and exhibited stereotypy. That is, they showed a tendency to repeat former responses. Representatives of this second population comprised 26.8 per cent of the members of the concentrated punishment groups



(*A* and *I*) and 2.2 per cent of the members of the less concentrated punishment groups (*B*, *II*, *III*, and *IV*).

The members of the first of these populations can, most plausibly, be regarded as motivated, those of the second population as frustrated. Some readers may object to this viewpoint and present either the *disruption*<sup>11</sup> or *disintegration*<sup>12</sup> theory as the true explanation. However, these theories are untenable for a number of reasons. In the first place, disruption would not explain any inhibiting effects found in this experiment. It would simply prevent the formation of as many associations during the no-solution period, thus, if anything, speeding rather than slowing later learning. Secondly, although disintegration would operate only during a period of intense motivation, four slow-learning members of Group I made remarks indicating the development of a state of apathy. Thirdly, the behavior patterns observed were typical of those produced by frustration. At least one and possibly two subjects showed complete fixation of their principle of choice. In addition, Subject *I-A* exhibited stereotypy of remark (he repeated the same phrase a large number of times), and *I-D* regressed to the point of weeping. Aggression was noted in the form of unnecessary roughness with the apparatus and in such remarks as those of *I-AN* about the Jewish people and of *I-AC* and *A-N* about the experimenter because of the type of procedure being employed. These behavior types would not be expected to result from disruption nor from disintegration. Finally, two subjects volunteered the information that they felt compelled to continue using the same bases of choice. This, although of uncertain value when considered in isolation, agrees with the findings of Maier and his students who demonstrated that abnormal fixation in the rat is of a compulsive nature (21, 22, 23, 14).

Those members of each of the groups employed in the investigation who fall into one population have been referred to as constituting a sub-group. The reality of the distinction between the sub-groups is evidenced by the bimodality of the distribution of Group I learning scores and by a number of non-linear relationships. There are significant differences between the

<sup>11</sup>Tolman, Hall, and Bretnall present the disruption theory in the following passage: "As such it (punishment) would tend to hinder learning wherever it is introduced. Introduced after the wrong response it would tend to cause distraction and to prevent them being remembered as wrong, and introduced after the right response it would tend similarly to cause distraction and to interfere with their being remembered as right" (31, p. 612).

<sup>12</sup>Dodson (4, 5) uses the term *disintegration* to refer to a tearing-down process which he feels to be due to excitement and to work in opposition to the building-up process. He says, "If the stimulus (motivating) is too strong, there may be a spread of neural impulses and the integrating process may be hindered by a disintegrating process" (5, p. 63).

stereotypy scores of all frustrated and all non-frustrated subjects. The average *Personality Inventory* scores of the frustrated members of Group I differ from those of the non-frustrated members of that group. In neither of these instances is there a comparable relationship within a sub-group. Although there was no significant difference in mean rate of choice between the two sub-groups comprising Group I, there was, when all motivated subjects were combined, a negative correlation between the number of seconds required to make 10 choices and the number of trials required to learn. There was no significant relationship of this type among the frustrated subjects.

Thus it appears that punishment in a no-solution situation can frustrate human subjects and that Maier and his students are right when they maintain that frustration and motivation produce qualitatively different patterns of behavior (21, 22, 23, 24, 14).

## 2. Educational Implications

The present study, although employing college students as subjects, argues in favor of an increase in the democratic and progressive natures of our elementary schools. Punishment, autocratic leadership, and failure may result in frustration and hence lead to such behavior patterns as stereotypy, regression, aggression, or encysting.

Children should not be put into situations requiring the establishment of habits which are too complex for ready acquisition at their developmental level. For example, an organismic age of six and one-half years is a pre-requisite for learning to read and too early or too drastic training appears to result in aggressive behavior (27). Such training procedures may cause regression, or, if the boundaries are not too firmly fixed, such detour behavior as "skipping school," cheating, or verbatim memorizing of the material to be read aloud in the classroom. Even in a progressive school, the University of Michigan Elementary School, *poor* growth and the concomitant slowing of academic progress was accompanied by an increase in emotionality (28).

The marking system is another source of frustration in many of our schools. Children or parents may be dissatisfied with the grades received. However, since grading is commonly in terms of the child's performance relative to that of the group rather than relative to his own ability, the child does not possess sufficient means of improving his status.

These arguments for the elimination of frustrating conditions may appear to be in conflict with such views as those of Freud (6, 7, 8, 9) and Alexander (2) who refer to the constructive values of frustration. Alexander goes so far as to say: "The emotional experience which we call frustration

is an essential part of life" (2, p. 465), and that he "... doubts whether life, as a biological phenomenon, would be possible in a universe where frustration had been fully eliminated" (2, p. 465).

The crux of the matter lies in the definition of frustration. When it is defined as a mechanism for the production of qualitatively distinct behavior (21), its results are generally of a destructive and undesirable sort. Although it is realized that many of the great social movements have owed their origin to frustration, it is difficult to imagine any desirable manifestations of frustrations in the learning situation, unless there is a substantiation for humans of the findings of Maier and Klee (22), that being frustrated on one occasion increases resistance to it in the future. However, it is probable that frustration can never be kept at such a low level as to render this a desirable aim. The effects of frustration in the learning situation are, for the most part, slower learning, reduced plasticity, and the establishment of undesirable responses. In some instances neuroticism may develop. Johnson (12) has demonstrated that even telling a child "no" or "don't," frequently leads to frustration and hence results in aggression.

When an effort is made to eliminate any undesirable response, determination should first be made of whether the response is a habit or an abnormal fixation. As we have noted, guidance is of value for the elimination of an abnormal fixation but not of a habit, and continued failure or punishment eliminates a habit but not a fixation. Resistance should be handled by attempts to determine its source rather than by pressure designed to break it.

### 3. *Personality Correlates*

When all of the possible criteria of frustrations are combined, the Bernreuter *Personality Inventory* fails to detect any differences between the personalities of the frustrated and non-frustrated members of Group I. However, each criterion has some personality correlates and most of these differences are in the expected direction. The subjects who exhibited "quitting behavior" were introverted, submissive, lacking in confidence, and scored high in neurotic tendency.

The difference of higher neurotic tendency scores by the subjects exhibiting "quitting behavior" than by those maintaining the required interval between sessions differs from the findings of Adams (1) who found no differences. However, Adams' groups were comprised of individuals who made extreme scores on the neurotic tendency scale, and thus they may have been, for the most part, made up of poorly adjusted individuals. It has been reported (16, 11) that extreme scores on the neurotic tendency scale are indicative

of poor adjustment. Another source of this difference may be inherent in the criteria employed. Adams' subjects were regarded as having exhibited "quitting behavior" when they expressed a disinclination to continue, while the subjects employed in this study were regarded as having shown such behavior when they refused to make or failed to keep an appointment.

The subjects who exhibited behavior patterns typical of frustration, but relieved their tensions and learned in 100 or fewer trials, scored low in neurotic tendency and high in self-sufficiency. They were extroverted and dominant. On the other hand, those subjects who exhibited such behavior and yet formed the habit very slowly scored low in self-sufficiency and differed from the average only slightly in neurotic tendency, confidence, extroversion, and sociability. This is as would be predicted since extroverted and confident individuals would be expected to express their feelings. While those who showed frustration reactions but still learned slowly would be expected to be less extroverted, less self-sufficient, and less confident since such individuals would experience greater difficulty in the elimination of internal tensions.

The slow learning members differed from the members of the concentrated punishment group who learned normally in self-sufficiency and perhaps also in sociability but not in neurotic tendency. This is contrary to expectation since it is generally agreed that neurosis is associated with frustration. It appears that neurotic tendency, as defined by the B1-N scale, is not the same as susceptibility to frustration.<sup>13</sup> However, according to Marshali (25), scores in B2-S are as important as those in B1-N as indications of neuroticism, and Landis (17) found that B2-S was the only scale yielding a significant difference between his normals and abnormals.

The results of this study suggest that exposure to a punishment situation may reveal more about the individual than does administration of the *Personality Inventory*.

#### F. SUMMARY

Two different sets of conditions were employed in this study. The subjects used in the preliminary investigation were first required to learn a complex discrimination habit, then were subjected to a no-solution situation, and finally were put into a situation which required the establishment of a simple position habit. For the main experiment, the original learning situation was

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<sup>13</sup>Slow learning, because of its objective nature and because subjects with valid reasons for failure to keep appointments might be included as showing "quitting behavior," is the most satisfactory criterion of frustration available in this study.



omitted. Throughout the study, erroneous judgments were followed by electric shocks.

The results of the two parts of the experiment clearly indicate that in a no-solution situation concentrated punishment is more frustrating than is punishment of a less concentrated sort. This is true even when the number of shocks is held constant. A greater percentage of the members of Groups *A* and *I* (the concentrated punishment groups) than of Groups *B*, *II*, *III*, and *IV* established the position habit very slowly. Of the 147 subjects who either acquired or were not required to acquire the preliminary habit and who maintained the required interval between sessions, 17 either required over 126 trials to learn the position habit or failed to learn in the time allowed. Of these slow-learners, 15 were members of Groups *I* and *A*. Thus 26.8 per cent of the members of the concentrated punishment groups and only 2.2 per cent of the members of the other groups learned exceedingly slowly.

These slow-learners have been regarded as frustrated for a number of reasons. (*a*) The disruption theory of the effect of punishment, which has received wide acceptance, would not explain any inhibitory effects found in this experiment. (*b*) Disintegration cannot explain the slow learning by those individuals who characterized their attitude during the position habit situation as one of apathy. (*c*) Behavior protocols containing evidences of aggression, regression, stereotypy, and resignation were obtained. And (*d*) there were numerous evidences of the independent operation of two different mechanisms of behavior production.

This lack of continuity of process was revealed by the following findings: (*a*) The distribution curve of the rates of learning of Group *I* (a concentrated punishment group) is bimodal. (*b*) The subjects who learned very slowly exhibited greater stereotypy of response than did those learning within the normal period of time. However, within the region surrounding each mode there is no relationship between these two variables. (*c*) The rate of choice was found to be related to the number of trials required to form the position habit so long as frustration effects were not dominant. However, averages for frustrated and non-frustrated subjects do not differ significantly. (*d*) The slow learning members of Group *I* were less self-sufficient and probably more sociable than were the more rapid learners. This relationship was not found to exist within any sub-group. And (*e*) two subjects said that they felt constrained to continue the application of certain principles of choice although they knew them to be erroneous.

These evidences of a break of continuity of process provide support for

Maier's definition of frustration which states that frustration and motivation are qualitatively different instigators of behavior. Were the differences in the two mechanisms merely of a quantitative sort the relationships should be linear and the frequency distribution should be normal.

When all of the possible criteria of frustration, slow learning, "quitting behavior," and behavior protocols revealing stereotypy of remark, aggression, regression, and resignation, are combined, no significant relationships between frustration susceptibility and Bernreuter *Personality Inventory* scores were noted. However, the different manifestations of the condition were found to be related to Inventory scores. (a) Those subjects who exhibited stereotypy differed from the remaining subjects in being less confident and probably more sociable. (b) Those subjects who exhibited "quitting behavior" scored higher in neurotic tendency, were more introverted, more submissive, and less confident than the remainder of the subjects. (c) The subjects who exhibited behavior typical of frustration but relieved their tensions and learned in 100 or fewer trials scored low in neurotic tendency and high in self-sufficiency. They were extroverted, dominant, and confident. On the other hand, those subjects who showed such behavior and still formed the habit very slowly were slightly less well adjusted than the remaining members of the slow learning group.

Although frustration has resulted in many of the great social movements of the past, its effect in the school system is shown to be undesirable. Frustration in the learning situation results primarily in slow learning, reduced plasticity, and the establishment of undesirable responses. In administering punishment we must remember that it may frustrate as well as motivate. A negative incentive effect of punishment was shown by the more rapid abandonment of a formerly established habit by those subjects who were exposed to 100 per cent punishment than by those punished only 50 per cent of the time.

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